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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/509,371	05/27/2005	Takuya Sugawara	101249.55458US	3837

23911 7590 03/23/2006

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EXAMINER
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LEE, CHEUNG

ART UNIT	PAPER NUMBER
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2812

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/509,371

Applicant(s)

SUGAWARA ET AL.

Examiner

Cheung Lee

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 03 March 2006.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-7 is/are pending in the application.  
4a) Of the above claim(s) 6 and 7 is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-5 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 28 September 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 1-05-05.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Notice to Applicant***

1. Applicants' Preliminary Amendment filed on May 27, 2005 has been entered and made of record.

***Election/Restrictions***

2. Applicants' election of Group I, claims 1-5, in the reply filed on March 3, 2006 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2 and 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakawa et al. (JP 2000-294550; hereinafter "Murakawa") in view of Parker et al. (US Pub. 2004/0110361; hereinafter "Parker").
4. With respect to claim 1, referring to figures 1, Murakawa discloses a process for forming an underlying film, comprising: irradiating the surface of an electronic device substrate 1 with plasma based on a process gas (paragraph 29) comprising at least an

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oxygen atom-containing gas (paragraph 16), to thereby form an underlying film 21 on the electronic device substrate, but Murakawa does not disclose expressly wherein irradiating the surface of an insulating film 22 disposed on the substrate, to thereby form the underlying film at the interface between the insulating film and the electronic device substrate.

Referring to figures 2a-2d, Parker discloses wherein forming a gate dielectric 205 on a substrate 200, then forming a buffer layer 210 at the interface between the gate dielectric and the substrate (see fig. 2b) by plasma assisted oxidation (page 2, paragraphs 15 and 21).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use the formation of an underlying film between an insulating film and a substrate, as taught by Parker.

The motivation for doing so would have been to obtain a dielectric film with less oxygen vacancies and less impurities showing superior film properties (Parker, page 3, paragraph 23).

5. With respect to claim 2, Murakawa in view of Parker discloses wherein the insulating film is a film comprising a high-k (high-dielectric constant) material (Parker, page 2, paragraph 20).

6. With respect to claim 4, Murakawa in view of Parker discloses wherein the underlying film is an oxide film (Murakawa, paragraph 29; Parker, page 2, paragraph 21).

7. With respect to claim 5, Murakawa in view of Parker discloses wherein the plasma is plasma based on a plane antenna member (RLSA) (Murakawa, paragraph 24; see abstract).

8. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Murakawa in view of Parker, as applied above, and further in view of Suzuki et al. (US Pat. 6497783; hereinafter "Suzuki").

Murakawa in view of Parker discloses a plasma containing oxygen (Murakawa, paragraph 29), but Murakawa in view of Parker does not disclose expressly wherein a plasma containing oxygen radical.

Suzuki discloses radicals of the plasma from processing gas, which are used to process a wafer (col. 29, lines 40-45).

At the time of the invention it would have been obvious to a person of ordinary skill in the art to use oxygen radicals of the plasma, as taught by Suzuki.

The motivation for doing so would have been to obtain better oxidation at low temperature, and to form an uniform oxide layer.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cheung Lee whose telephone number is 571-272-5977. The examiner can normally be reached on Monday through Friday from 8:30AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cheung Lee

March 17, 2006



HANGUYEN  
PRIMARY EXAMINER